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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/777,721

02/11/2004

Olivier Rayssac

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28765

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02/23/2005

WINSTON & STRAWN
PATENT DEPARTMENT
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EXAMINER

LINDSAY JR, WALTER LEE

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 02/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/777,721

Applicant(s)

RAYSSAC ET AL.

Examiner

Walter L. Lindsay, Jr.

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 1-15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 16-28 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>10/14/2004</u> . | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

This Office action is in response to an Election filed on 12/27/2004.

Currently, claims 1-28 are pending. Claims 1-15 have been withdrawn from consideration.

Election/Restrictions

1. Applicant's election with traverse of claims 16-28 in the reply filed on 12/27/2004 is acknowledged.
2. Claims 1-15 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected device, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 12/27/2004.
3. Applicant's election with traverse of the restriction in the reply filed on 12/27/2004 is acknowledged. The traversal is on the ground(s) that the process of the method forms the structure claims. This is not found persuasive because applicant's the structure does not have to be made by the process as described by the method, for instance the molecular bonding is can be replaced by any conventional method and the structure would still be formed.

The requirement is still deemed proper and is therefore made FINAL.

Drawings

4. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in

compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

5. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

6. Claims 16 and 25 are objected to because of the following informalities: "a typical" should be "atypical". Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

8. Claims 16-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

9. The term "atypical" in claims 16, 17, 25, and 26 is a relative term, which renders the claim indefinite. The term "atypical" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary

skill in the art would not be reasonably apprised of the scope of the invention. The term does not specifically state whether the surface is vague as to whether the surface is rough, unsuitable for molecular bonding or not easily polished. The examiner suggests replacing "atypical" with a listing of the properties the surface exhibits.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 16-18, 20-21 and 23-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Linn (U.S. Patent No. 5,782,975 dated 7/21/1998).

Linn shows the method as claimed in Figs. 1A-5F and corresponding text as: providing a substrate (12) having a surface and being made of a material that provides "atypical" surface properties to the surface (col. 1, lines 16-39); providing a bonding layer (20) on the surface of the substrate (col. 1, lines 16-39); smoothing the bonding layer to provide a surface that is capable of molecular bonding (col. 1, lines 16-39) (commonly used bonding methods can be used); molecularly bonding a further layer (22) to the bonding layer to form the structure (col. 1, lines 16-39) (claim 16). Linn teaches that the atypical surface properties comprise at least one of a roughness of more than 0.5 nm rms, or a roughness of at least 0.4 nm rms that is difficult to polish, or a chemical composition that is incompatible with molecular bonding (CVD diamond) (col. 1, lines 16-39) (claim 17). Linn teaches that an intermediate layer (22) is formed on the

Art Unit: 2812

substrate to provide the surface layer having the atypical properties before providing the bonding layer, the intermediate layer having a thermal conductivity coefficient that is higher than that of the substrate or that is between that of the bonding layer and that of the substrate (col. 1, lines 16-39) (claim 18). Linn teaches that the thermal conductivity of the substrate is more than 1W/cm/K (diamond substrate) (col. 1, lines 16-39) (claim 20). Linn teaches that the substrate material comprises at least one of diamond or aluminum nitride (col. 1, lines 16-39) (claim 21). Linn teaches that the further layer is made of a semiconductor (handle wafer is formed of silicon) (col. 1, lines 16-39) (claim 23). Linn teaches that at least one of a power component and a radio frequency (RF) component produced in the further layer (device formed in further layer) (col. 1, lines 40-60) (claim 24).

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

14. Claims 19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Linn (U.S. Patent No. 5,782,975 dated 7/21/1998) in view of Murari et al. (U.S. Patent No. 5,855,693 dated 1/5/1999).

Linn shows the structure substantially as claimed and as described in the preceding paragraphs.

Linn lacks anticipation only in not explicitly teaching that: 1) the intermediate layer is composed of silicon nitride (claim 19); and 2) the bonding layer material comprises at least one of silicon dioxide, silicon nitride, hafnium oxide, zirconium oxide, alumina or yttrium oxide (claim 22).

Murari teaches a bonding layer that connects two substrates. Murari teaches a first layer that is a substrate then an electrically insulating material (22) and a bond layer (23) between a second layer (col. 3, lines 9-15). Insulating layer 22 is formed of silicon nitride (Si_3N_4), which serves as an intermediate layer (col. 3, lines 16-25). The Bond layer (23) is formed of silicon oxide and is selected in such a way as to ensure bonding (col. 3, lines 26-33). The use of layers 22 and 23 help in reducing high operating current density that allow for sufficient heat dissipation, reducing high junction temperatures and increasing the reliability of the components (col. 2, lines 22-33). It allows for the inherent advantages of SOI technology (col. 2, lines 34-37).

It would be obvious to one of ordinary skill in the art, at the time the invention was made, to modify the method of Linn by implementing the intermediate layer is composed of silicon nitride and the bonding layer material comprises at least one of silicon dioxide, silicon nitride, hafnium oxide, zirconium oxide, alumina or yttrium oxide

as taught by Murari with the motivation that Murari teaches that a silicon nitride intermediate layer and a silicon oxide bonding layer help in reducing high operating current density that allow for sufficient heat dissipation, reducing high junction temperatures and increasing the reliability of the components. Additionally, Murari allows for the inherent advantages of SOI technology.

Allowable Subject Matter

15. Claims 25-28 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter L. Lindsay, Jr. whose telephone number is (571) 272-1674. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

WLL

February 15, 2005


MICHAEL S. LEBENTRITT
PRIMARY EXAMINER